

# P-TRIZ in the History of Business Processes

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## 1 Development of Business Process Modelling (BPM)

### 1.1 The Origins

The history of BPM is long and rich. It began in the 1920s and was dominated by Frederick Taylor's "The Principles Science of Management". In addition to these structural approaches, management was primarily seen as leadership based on experience (such as "Mintzberg on Management"). Russell Ackoff developed modelling for the first time in the 1970s with his approach of "Interactive Planning", which was explicitly based on systemic concepts of regulation developed in the cybernetics wave of the 1960s, see [5] for details.

### 1.2 1990: Business Process Reengineering (BPR)

Creativity is directed on process articulation and manual reengineering.

- Process lateral thinking
- Reengineering techniques
- Decades old technique for re-inventing business processes
- Based on management wisdom, creativity, common sense change management and rules of thumb.

Development of process landscapes, reference models for processes such as the ISO 9000 model

### 1.3 2000: Business Process Management Systems (BPMS)

Creativity is directed on process technology and executable digitised Business Processes.

- Executable processes
- Direct path to implementation
- Management of the process lifecycle
- Process modelling languages
- The discipline of using process models as a direct basis for the implementation of IT systems in support of those processes.
- The use of IT solutions (BPMS) to govern the lifecycle of process improvement: discovery, design, deployment, execution, operation, change and optimisation.

- A digital representation for business process (“process as data”) opening the door to manipulation, generation, transformation, not just automation.
- Obliterating a business-IT divide – empowering the business user.

#### 1.4 2005: Business Process Innovation (P-TRIZ)

Creativity is directed on process methodology and management of Business Process Landscapes.

- Exhaustive generation of re-design options
- Systematically solve problems in processes
- Use of modern innovation methods (P-TRIZ) to accelerate and systematise the generation of reengineering options.
- Amplifies the creativity of practitioners to exhaustively explore re-design alternatives.
- Knowledge management (problem-solution) of process patterns.
- A reliable and guided process to resolve contradictions in process design.

#### 1.5 200?: Business Process Realisation (Transformation)

Very hypothetical yet (15 years later)

- Automatically realise ideal process models along selected innovation pathways. An automated “To be” process generator
- P-TRIZ directions, linked to P-TRIZ operators, traverse an “As is” process model to generate a future process (increased Ideality)

Each era of BPM has added new capabilities to the last. For example, BPM systems enable process architects to readily deploy creative new process designs, sidestepping time and resource intensive implementation projects of the past that so denuded and distorted reengineering of its creative potential. Now, P-TRIZ is an emerging method that builds on the shoulders of those giants.

P-TRIZ is the application of modern TRIZ towards business process improvement, innovation, and transformation. Coupled to BPM methods, it provides the engineering discipline that amplifies the creativity of those who seek to re-design processes.

## 2 What is Innovation?

Smith, Part 1:

**Innovation** is the process by which new commercial concepts – products, services, processes – are brought into being, in order to generate business. It requires uncontrollable creativity positioned side-by-side with disciplined business practice.

Most companies find it tremendously difficult. Innovation, the goal of creating new top-line value, is the antithesis of unreliable, hit-and-miss, trial-and-error, psychological means of lateral thinking and brainstorming. Rather, [...] innovation must be repeatable, procedural, and algorithmic. Making effective progress requires much more than inspiration.

## 2.1 Innovation as Challenge

Innovation is not only about products but also about processes of creation and use of the products (see also the VDI norm 3780 defining the term *technology*).

Smith, Part 3:

Taking a creative or innovative idea and turning it into cash involves almost every part of a company. The new competitive battlefield is [...] the design, the warranty, the service deal, the image, and the finance package. [...] You can hardly separate the product from the service, and all services are driven by *processes*.

Innovation is not only limited to high tech sectors of the economy, but is rather an omnipresent driver for growth. Companies that recognise this will not define innovation as owned by one part of the organisation or applying only to those working in leading edge R&D. [...] These process innovation concepts are echoes of the reengineering mantra of the early 1990s.

The challenge in innovation today is thinking about and managing this extremely broad set of interrelated activities as a unified process.

## 2.2 Tool Based BPMS

These developments have led to a very detailed understanding of how company-internal processes are to be structured and which areas are to be differentiated. Corresponding cross-industry frameworks have become established, such as the seven levels of APQC.

APQC Cross Industry Process Classification Framework. Level 1 – Categories [2, 3, 4]

- 1.0 Develop Vision and Strategy
- 2.0 Develop and Manage Products and Services
- 3.0 Market and Sell Products and Services
- 4.0 Deliver Physical Products
- 5.0 Deliver Services
- 6.0 Manage Customer Service
- 7.0 Develop and Manage Human Capital
- 8.0 Manage Information Technology (IT)
- 9.0 Manage Financial Resources
- 10.0 Acquire, Construct, and Manage Assets
- 11.0 Manage Enterprise Risk, Compliance, Remediation, and Resiliency
- 12.0 Manage External Relationships
- 13.0 Develop and Manage Business Capabilities

Smith, Part 3:

In the Third Wave of BPM, creative process design has been given a new path to execution in the form of **business process management (BPM) systems**. These are IT tools that bring work processes to life in the enterprise.

Such tools have transformed our ability to visualize, develop, and deploy enterprise applications for much needed processes. BPM software provides many benefits to both process owners and to IT developers [...] One documented benefit is a reduced process design to deployment time and resource cost.

Yet BPM tools are no panacea. BPM deployment tools can only provide a fast track to results once the process has been re-designed. Re-designing any process beyond minor optimisation is still very much a creative human act.

## 2.3 Innovation as Process

Innovation as process re-design is itself a process that should be systematically planned, designed and implemented.

Those who model, re-design, and deploy significant new business processes in support of innovation also need a process. I call that process P-TRIZ. [...] The potential for a reliable and general-purpose innovation methodology that can be applied to processes has never been greater.

## 2.4 Innovation is Much More Than Invention

Smith, Part 3:

**Innovation** is the end-to-end process by which improved, renewed, or replacement products, solutions, and services are delivered in practice, generating new “top line” business value.

Everyone has his or her own definition of innovation. It is now generally agreed that **innovation is distinct from creativity and invention**, and that it is an end-to-end process whose objective is the generation of value.

Companies sorely need creativity and talent, but they also need more than bright ideas when reengineering. Dreaming up a process on a whiteboard is one thing, making it happen quite another.

Making effective progress requires more than inspiration, it requires a method. For too long, BPM has been an art. If results from BPM projects are overly dependent on expensive consultants or rare insightful managers, BPM will never cross-the-chasm and take its place among side more established business practice.

Far from a sporadic inventive act, leading organisations treat innovation as a **systemic and systematic activity**. That process can, within limits, be codified and improved.

P-TRIZ is making its contribution in the domain of process design. It is part of the journey towards a comprehensive process engineering that is less reliant on unreliable, sporadic, and ad-hoc creativity.

My belief is that the next frontier for those wishing to advance the field of BPM is where they will put themselves out of a job to **turn BPM into a science**, and deliver it in a form that can be used by everyman.

Where BPM put the engineering back into the IT-side of reengineering, P-TRIZ seeks to **inject engineering into the creativity side of BPR**.

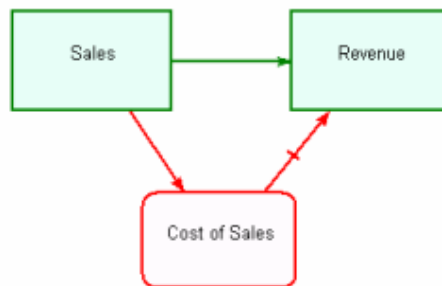
My vision for P-TRIZ is this: Where a BPMS can free business users from dependence on technicians for the IT change around process, P-TRIZ will free them from dependence on specialists for the process re-imagining around change.

### 3 What does TRIZ offer?

Smith, Part 2: Process Innovation Models based on modelled Business Process Landscapes with emphasis on

- distinguishing useful and harmful processes,
- stronger cause-effect relations between functions, distinguishing relations producing or counteracting useful or harmful functions.

*Abstract example:*



**Figure 4 – P-TRIZ model of the Sales Process**

Smith, Part 3:

- Development of useful-harmful *functional models* of processes
- Identification of *process-contradictions*: conflicting function points that link problem-solving knowledge to pain-points
- Generation of (*abstract*) *solution pathways* (BPR)
- Management of a "world-wide" solution knowledge for *process re-design patterns*
- Opening a path to *process "Ideality"*.

P-TRIZ lets practitioners capture the "why" aspects of solution design in addition to the "what/how" inherent to today's BPM modeling paradigm. P-TRIZ will be of interest to process and org-change practitioners who have never modeled a business process formally in their life.

#### 3.1 Ideal Process

If business leaders are to have full confidence in BPM methods and tools, process *innovation* must guarantee a progression towards *more ideal processes*. This is what P-TRIZ seeks to achieve.

This is a general pattern for technological systems. They tend to evolve in the direction of increasing ideality. In other words, systems become smaller, less costly, more energy efficient, pollute less, and so on.

Processes are also technological systems. They comprise many participants – people, systems, and machines – and they operate much like a complex machine with many concurrently

executing parts. They too will tend towards ideality. If your competitors offer more ideal processes, your company is at a disadvantage. All companies should be on the look out for more ideal processes: That is what *process innovation* means.

To get a measure of ideality, TRIZ proposes the ratio of a system’s useful functions to its harmful functions.

$$\text{Ideality} = \frac{\text{Sum of useful functions}}{\text{Sum of harmful functions}} \quad (\text{Smith' definition})$$

$$\text{Ideality} = \frac{\left( \begin{array}{c} \text{Revenue from} \\ \text{useful functions} \end{array} \right) - \left( \begin{array}{c} \text{Losses from} \\ \text{harmful functions} \end{array} \right)}{\text{Costs}} \quad (\text{Souchkov's definition})$$

Smith: *Ideality* is clearly a qualitative assessment rather than a quantifiable number. Nonetheless, the concept of ideality is important, as it helps us understand what reengineering must achieve – a more ideal system or process. It drives us to think about the process of process re-design so as to achieve ideality.

### 3.2 Useful and Harmful Functions

For processes, *functions* (useful or harmful) are their outputs, activities, actions, steps, resources, tasks, or any other factors inherent to the execution of the process.

The useful functions can be classified as follows:

- *Primary (Main) useful function* – the purpose for which the process was designed.
- *Secondary functions* – other useful functions that the process provides in addition to the primary useful function.
- *Auxiliary functions* – functions that support or contribute to the execution of the primary function, such as corrective functions, control functions, compliance functions, etc.

### 3.3 Processes Vanish – the Ideal Machine

Given the definition of ideality as the ratio between a system’s useful functions and its harmful functions, we can imagine the most ideal system of all. It would be a system in which there are no harmful functions at all – in other words, it would cost nothing to design, implement, or maintain, use no energy, take up no space, would emit no harmful byproducts, and so on. Stated another way: **An ideal system is one whose functions are performed without the system existing; no “system” at all, just all the benefits.**

Taking this TRIZ principle and applying it processes, we have this: The objective of reengineering is to **get rid of processes altogether!**

Wouldn’t we like all processes to be this way? Wouldn’t it be great if product availability could be achieved without inventory? Wouldn’t you like to consume services at zero cost to you? Shouldn’t a supply chain operate without a supply chain process?

We never actually need a process; what we really need is a *function*. While this statement may sound strange, it is undoubtedly true. The objective of reengineering is to turn processes into functions, and to remove activity, leaving benefit.

Ideality – sometimes called the Ideal Final Result in TRIZ – is part of a collective wisdom. How often has it been said that business processes are best designed to provide their benefits in the *simplest* possible manner? Now we know what that means. We aspire to take the process out of the process. P-TRIZ is bringing a science and approach to that common sense wisdom.

### 3.4 Systemic Development

Is Anything Ever Completely Useful Or Harmful?

As process engineers, we work to reveal, and then eradicate, the harmful functions. We convert “As Is” process designs toward “To Be” process designs by transforming the cause-effect links between useful and harmful elements, and by finding solutions (new functions) that convert harm into useful output.

We also limit or counter-act the effect of harmful functions by exploiting many kinds of available resources within or surrounding the domain of the process and its environment – including relationships, time, finance, and many other types of resources.

**Resource analysis plays a great role in P-TRIZ.**

## 4 Why Using P-TRIZ (i.e. Business TRIZ)?

Companies using TRIZ find that it *focuses* their knowledge and talents on the problem-solving process. Specifically, TRIZ focuses on problems preventing progress in innovation, the process by which new commercial concepts – solutions, services, processes – are brought into being in order to generate business. In this idea-to-cash process, a complex cocktail of obstacles limits a company’s ability to innovate right across the value chain, from mind-to-market, and covering every conceivable technical and managerial discipline.

Examining the details of many TRIZ stories, Computer Sciences Corporation concluded that TRIZ principles could be used in any field, not just engineering. TRIZ is simple enough to be used in response to an email enquiry and sophisticated enough to guide an entire program of activities. TRIZ is for school children as well as postgraduate scientists.

P-TRIZ can be considered an application of modern TRIZ. P-TRIZ will add to the body of worldwide TRIZ knowledge, including

- *Specific vocabularies* for a consistent modelling of processes using TRIZ.
- *TRIZ solution patterns* that apply specifically to processes.
- *Bindings* between TRIZ modeling constructs and accepted process modeling in languages and notations.
- *Evolutionary trends* observed as processes tend towards Ideality.
- Workshop and project *practices* that facilitate the practical and efficient use of TRIZ in a “commerce time” reengineering context.

- A small number of *extensions to the standard modern TRIZ notation*. The objective is to enrich TRIZ formulation in support of Business Process and Enterprise Architecture Innovation.

Smith: We have been doing BPR for years. Most – but, likely, not all – of the possible solution patterns are known. Now, with the advent of a BPMS that can speed new processes to implementation, it would be foolish indeed to wait for the right process expert to come along and help our improvement project. Companies need a “just in time” process knowledge. It’s high time we encoded reengineering wisdom and set out to create actionable insights for BPM practitioners. I know of no better approach than TRIZ.

## References

- [1] Russell L. Ackoff (1971). Towards a system of systems concept. *Management Science* 17 (11), 661-671.
- [2] The APQC’s Process Classification Framework (PCF).  
<https://www.apqc.org/process-frameworks>
- [3] APCQ (2018). Cross Industry Process Classification Framework v.7.2.1
- [4] APCQ (2021). Best Practices in Applying Process Frameworks.
- [5] Hans-Gert Gräbe (2021). Seminar Notes. Summer Semester 2021.  
<http://www.informatik.uni-leipzig.de/~graebe/skripte/Notes-S21.pdf>
- [6] Howard Smith (2004). What Innovation Is – How Companies Develop Operating Systems For Innovation. Computer Sciences Corporation.
- [7] Howard Smith (2005). From CIO to CPO via BPM: The Next Generation of Enterprise Automation. Computer Sciences Corporation.
- [8] Howard Smith (2006). P-TRIZ in the History of Business Process. Part 3 in a series on P-TRIZ. Computer Sciences Corporation.